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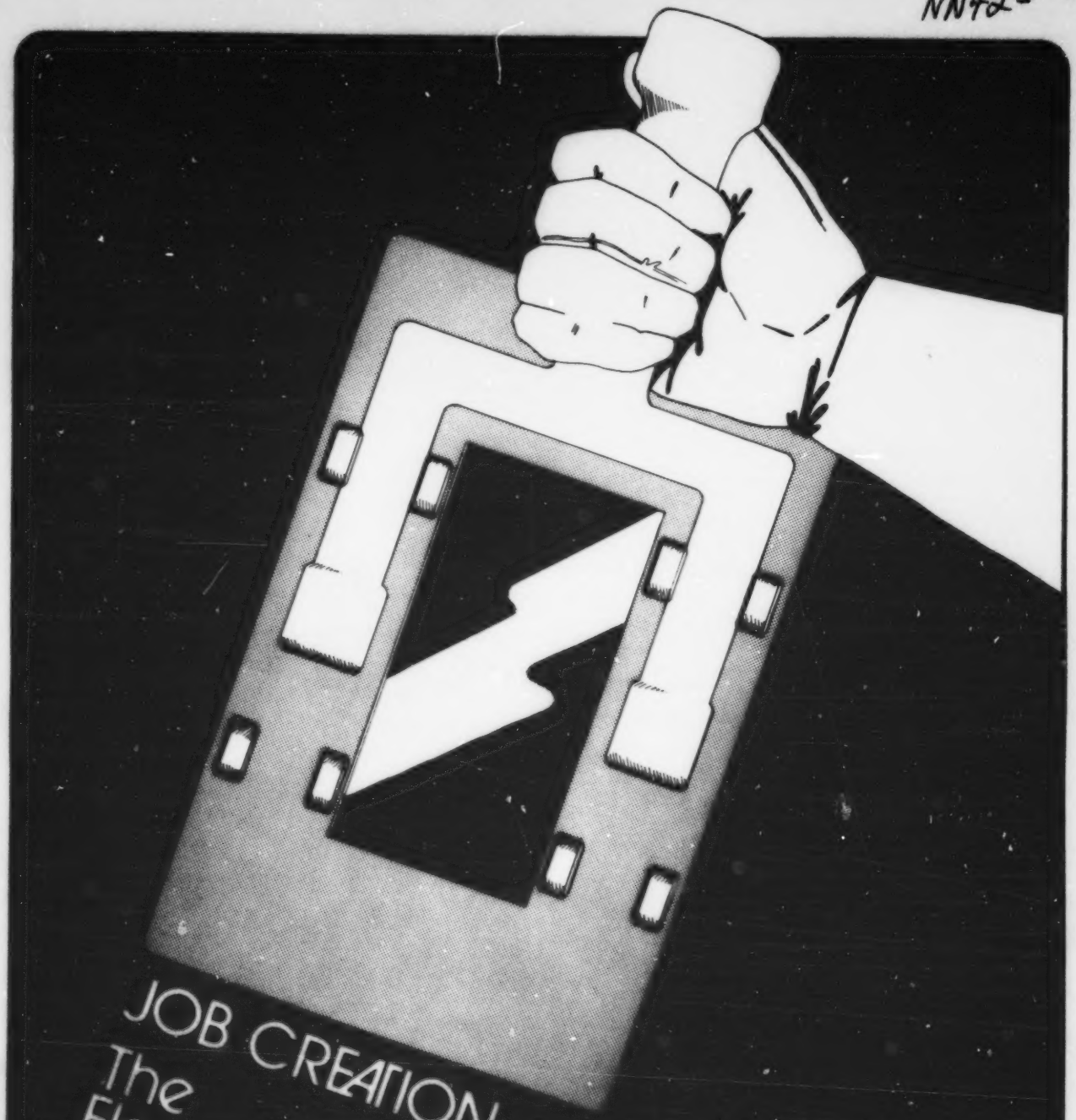

JOB CREATION
The Electrotechnology Way

Joint Industry Task Force

October 1984

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JOB CREATION – THE ELECTROTECHNOLOGY WAY

A Report of the Joint Industry Task Force

To

The Honourable William G. Davis

Premier of Ontario

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SEPTEMBER 1984

EXECUTIVE SUMMARY

The Joint Industry Task Force has pursued over the past two years, new initiatives that would help utilize Ontario Hydro's existing available capacity. The main objectives of these endeavours are job creation and improved economic activity. The initial phase of this work related to what could be achieved immediately in the residential sector.

The Task Force in the present phase of its activity has focused on opportunities for the use of electrotechnology in Ontario's industrial sector. A team of industry experts formed a special group of the Task Force called the Industrial Processes Electrification Committee (IPEC). IPEC has carefully examined over the past year, various issues specifically related to electrotechnologies and their adoption in the industrial sector. Technological aspects, environmental benefits, financial incentives and economic issues were evaluated and appropriate recommendations for action by the electrical industry, Ontario Hydro, the municipal utilities and the Government of Ontario are made in this report.

IPEC identified electrotechnologies that are currently available. It evaluated the relevance of these technologies to Ontario's industrial base, particularly in the context of productivity improvement and international competitiveness.

The intense international competition among the developed industrial economies and some of the newly industrialized nations for markets for manufactured goods has placed productivity improvements and technology upgrading as top priority items for Ontario's industrial sector. Mature industries must update their manufacturing processes and adopt the new electrotechnologies. Induction heating and melting, thermomechanical pulping and adjustable speed electric drive systems are some of the electrotechnologies of immediate relevance to Ontario's industries. These technologies impact on key sectors employing a large percentage of the labour force. The iron and steel industry, the foundry industry and the pulp and paper industry are some of the important ones.

Electrotechnologies will help these industries modernize and meet international competition head on in both the Canadian and the export markets. This is the only way to hold on to existing jobs and create new jobs. The alternative is the unacceptable option of technological obsolescence, industrial decay and loss of existing jobs.

With its current available capacity of electric power, Ontario has a unique opportunity to introduce on a large scale, electrotechnologies in its industrial base. This does not happen automatically but must be promoted. IPEC makes a case for enlarging Ontario's Hydro mandate to include the development of programs to encourage the use of electrotechnologies to hold existing industries and attract new industries.

Ontario Hydro already has an Industrial Marketing Program. This program needs to be expanded to fulfill the proposed extension of Ontario Hydro's mandate.

Electrotechnologies are indeed high-tech. Ontario's mature industries need high-tech for survival and growth. It is in this context that IPEC points out high-tech industries need the mature industries as markets for their products and technologies. High-tech industries by themselves cannot solve our employment and job creation challenges. The mature industries and the high-tech industries require one another. Electrotechnologies hold the unique prospect of making every Ontario industry potentially a high-tech industry.

Financial incentives and grants are required to promote electrotechnology applications among Ontario industries. Some changes are also required to the existing tax laws. These issues were discussed in detail with expert advice from the banking community and appropriate recommendations have been proposed.

Summing up, we have an ideal environment for growth and prosperity by adopting electrotechnologies in Ontario's industrial base. The key factors to be considered are:

(i) Ontario industries need electrotechnologies to survive and to face international competition

(ii) electrotechnology expertise is available in Ontario

(iii) Ontario Hydro has the capacity to handle the industries' requirement for electricity

(iv) increased electricity use helps reduce Ontario's energy import bill

(v) increased electricity use creates more jobs in Ontario than the use of gas or oil

(vi) the use of electrotechnology to improve quality and productivity has the potential to create more jobs than are lost by the use of technology.

RECOMMENDATIONS

- The Canadian electrical industry should increase its R & D and productivity improvement spending to enable it to supply quality products of the latest technology at competitive prices in the international market.
- The electrical industry should actively promote a comprehensive range of feasibility studies for implementation of the latest applications of electrotechnology with active support of all segments of industry and government.
- Through individual company and co-operative advertising, the electrical industry should promote the use of electrotechnology in Ontario industry.
- The industry should vigorously support Ontario Hydro marketing programs.
- The industry should embark on a campaign to develop closer liaison with Ontario Hydro and the municipal utilities.
- The industry should offer seminars to prospective users of electrotechnologies and electrical processes.
- The Task Force should be available as an advisory body to the Premier and the Government of Ontario and provide periodic progress reports on the implementation of the Task Force's recommendations made so far.
- Ontario Hydro's current advertising budget is less than 1/10 of 1 per cent of its annual revenue. The dollar expenditures should be increased and the program broadened to ensure adequate coverage to all major market segments (residential, industrial, commercial and agricultural). Also, the advertising activity throughout the electrical industry should be co-ordinated with appropriate co-operative and advertising programs wherever they are feasible.

- Ontario Hydro should develop a broader range of cost-based incentive rates with longer term commitments similar to their intermittent and monthly rates.

- Ontario Hydro should offer one or more rate seminars annually to the consulting community and electrical industry to ensure adequate knowledge of rate structures and trends.

- Ontario Hydro should increase its industrial field sales force from its present level of fourteen people in order to cover more effectively the various markets.

- Ontario Hydro should broaden the range of options for its financial incentives and reduce some of the restrictive features.

- The Ontario government should continue to support Ontario Hydro and the municipal electric utilities in the aggressive promotion of electrotechnology for increased consumer benefits.

- The Ontario Government should continue its support of nuclear generation as a safe, clean, economic, job producing, home-grown product.

- The Ontario government should establish an "Electrical Process Fund" of $250 million for new electrotechnology applications. Funds would be allocated on the basis of their ability to produce such benefits as improved productivity, a better environment or additional employment.

- The Ontario Government should embark on a program with Ontario Hydro for broader based electrification of remote communities.

- The Ontario Government should take whatever steps are necessary to improve the process of transmission line hearings. We now have a process for southwestern Ontario which has gone on for six years, which will result in some load rejections in 1985, and could potentially cost the electricity consumer and industry hundreds of millions of dollars per year if power is locked in at the Bruce.

- The Ontario Government should encourage Ontario Hydro and the electric utilities to compete "head to head" with its energy competitors. The consumer will be the net beneficiary.

- The Ontario Government should expand Ontario Hydro's mandate to include an industrial development objective.

- Ontario Hydro's rate structure should span a five-year period. This will help industries to make appropriate investment decisions and free the Hydro management to run their business.

MAJOR RECOMMENDATIONS

- An internationally competitive electrical industry.
- Industry promotion of electrotechnology applications.
- An industrial development mandate for Ontario Hydro.
- Expansion of Ontario Hydro's marketing program.
- An Ontario Government "Electrical Process Fund" of $250 million.
- New incentive rates with longer terms by Ontario Hydro.
- A continuing role for the Task Force.

1. AN INDUSTRIAL DEVELOPMENT MANDATE FOR ONTARIO HYDRO

1.1 THE INTERNATIONAL COMPETITIVE CHALLENGE

Canada along with other industrialized countries of the Western world has been caught in a unique set of circumstances over the past decade. Slow demand growth for manufactured products, unprecedented increases in costs of labour and material, rapid changes in technology and tough international competition are some examples of the main challenges facing the industrialized economies.

Many countries have developed strategies to strengthen their economies and provide them with competitive advantages based on national/regional resources and technological capabilities. Japan's co-ordinated drive in international markets for manufactured products, massive investments by France in high-tech and nuclear energy, concentrated export activity with attractive financial packages by the British are some examples of the response strategies developed by Canada's industrial competitors.

1.2 CANADA AND ONTARIO

Canada (and Ontario as its industrial heartland) has lost substantial ground in the international marketplace during the past three to four years. Declines in productivity growth, R & D investment, reduced market shares in world markets, particularly in manufactured goods, are some of the key indicators of Canada's deteriorating performance in the international league.

Canada and its provinces have taken a number of measures to remedy the situation and restore Canada's competitive advantages. A review of these measures and their effectiveness is out of context in this report. However, it is relevant to consider how Ontario can utilize to its advantage various options within its own jurisdiction. One such option is the utilization of Ontario Hydro as a tool of economic development.

1.3 ONTARIO HYDRO AND THE MUNICIPAL UTILITIES

Ontario Hydro is one of the largest corporations in Canada. It has internationally acclaimed expertise in the generation, transmission and distribution of electricity. It has a mandate, with the co-operation of the municipal utilities, "to supply power at cost" to the people of Ontario. This mandate precludes Ontario Hydro from developing programs and activities with specific focus on the economic development of the Province. This is in spite of the fact that Ontario Hydro is ideal for such a role.

Electricity has played an important role in Ontario's industries and, indirectly, in the overall economic development of the Province. Over the past eight decades, the provincial policies toward electricity supply and availability have encouraged a number of electricity/energy industries to locate in the Province.

1.4 AN OPPORTUNITY FOR ONTARIO

Today, another opportunity is available to the Province to utilize its advantages in the areas of supply and availability of electricity. Ontario's existing industries will go through a process of modernization to relate to the technologies of the twenty-first century. This is an opportunity for the Province to introduce on a large scale, electrotechnologies in its industrial base. These electrotechnologies will not be

automatically adopted by Ontario's industries. Electrotechnologies and their benefits must be promoted with appropriate policies and programs. The Province needs an implementation policy. Within a policy framework, Ontario Hydro with the co-operation and support of the appropriate ministries of the Government of Ontario, can take on the challenge of introducing on a large scale electrotechnology applications to Ontario industries.

1.5 ONTARIO HYDRO MANDATE

Toward this objective, Ontario Hydro's mandate should be enlarged to include the following:

1.5.1 to develop programs in co-operation with the municipal utilities to encourage and to facilitate adoption of electrotechnologies by the existing industries

1.5.2 to hold existing industries and to attract new industries that require dependable and competitively priced electrical power.

Ontario Hydro with an expanded mandate can become an industrial development agency of the Province.

1.6 ELECTROTECHNOLOGY

Electrotechnology plays a central role as the link between high-tech and the mature industries. Therefore, an industrial development policy for Ontario should be developed on Ontario Hydro's strengths in promoting electrotechnologies.

Electrotechnology requires as a prerequisite, availability of dependable, reasonably priced electrical energy. Ontario is fortunate in this area. Ontario Hydro has sufficient available capacity to introduce confidently electrotechnology applications in Ontario industries.

1.6.1 There are many benefits that accrue to Ontario's economy by large-scale adoption of electrotechnology in its industrial base. The obvious ones are productivity improvements and technology upgrading that will take place in the mature industries. What may not be so obvious are the economic spin-offs of increased electricity consumption and displacement of scarce and expensive fossil fuels.

1.7 HIGH-TECH AND MATURE INDUSTRIES

Lower productivity and escalating energy costs have reduced significantly the ability of Ontario's core industries such as pulp and paper, mining and smelting, and iron and steel, to remain competitive internationally. Low productivity and high energy costs have become the two main characteristics of mature industries. Because of these characteristics, the future of the mature industries or the smokestack industries is questioned. Their relevance in a high-tech industrial society is challenged. The long-term potential and the well-being of these mature industries are ignored in some strategies for industrial development on the wrong assumption that the mature industries do not belong in the high-tech twenty-first century.

The term high-tech is generally applied to industries that produce technologically advanced goods such as electronics and aerospace equipment. These industries have a crucial role to play in Ontario's economy, but cannot displace the existing mature industries. They are complementary. An industry using high technology processes to produce even a mundane product might also be regarded as a "high-tech" industry. Thus, high-tech products have an important role to play in the mature industries by improving productivity through new production technologies. Every Ontario industry is potentially a high-tech industry.

1.8 INDUSTRIAL DEVELOPMENT AND ELECTROTECHNOLOGY

An industrial development strategy for Ontario can be developed on Ontario's strengths in electrotechnology. The major strengths are in the following areas:

1.8.1 Ontario has one of the world's largest and best run electrical utilities

1.8.2 Ontario is the home base for Canada's electrical and electronic sector employing close to 100,000 people in the Province

1.8.3 Ontario's electrical industry, including all the segments, provides jobs for more than 250,000 people in Ontario

1.8.4 Ontario has a highly skilled technical manpower base to implement the electrotechnologies — consulting engineers, contractors, etc.

1.8.5 Electrotechnology expertise is available within the Province

1.8.6 Electrotechnology is a natural fit in Ontario's ambitious export promotion program.

2. ECONOMIC BENEFITS TO ONTARIO OF THE ELECTRICAL OPTION

2.1 ONTARIO'S FOSSIL FUEL BILL

According to reliable estimates, approximately $11 billion in 1982 and $13 billion in 1983 were paid toward Ontario's purchases of oil, natural gas and coal. These numbers represent the net outflow of money from the Province. As Ontario's economy gains momentum and the demand for oil, natural gas and coal increases, the outflow of money from the Province will further increase. The economic disadvantages of this situation are obvious. It is in this context that the advantages to the provincial economy of electrotechnology should be assessed.

2.2 ONTARIO'S ENERGY MIX

Three industries — iron and steel, industrial chemicals, and pulp and paper — currently account for about 50 per cent of the industrial sector's total energy requirement. Along with these three sectors, other major power consuming sectors account for a substantial portion of Ontario's jobs in the industrial sector.

The energy consumption mix of Ontario's industries is in the process of change. The Ontario Ministry of Energy provides the following breakdown of industrial energy mix per cent share for 1970 and 1980.

	1970	1980
Electricity	15	15
Oil	22	15
Gas	32	41
Coal	31	24
Others	—	5

SOURCE: ONTARIO MINISTRY OF ENERGY

The previous table indicates that both oil and coal have been displaced by natural gas in the seventies. It may be noted that these shifts in the energy mix occurred during the period when the industrial energy market expanded at an average rate of 2.2 per cent.

What are the economic implications of this shift? Natural gas has replaced both oil and coal. So, some cost efficiencies have been achieved. But what about the relative advantages of electricity and natural gas from an aggregate provincial prospective? In other words, would it have been more beneficial to the Province to have shifted away from oil and coal to electricity rather than natural gas?

To answer these "what if" questions, we have to look at the economic impacts of using natural gas and electricity.

2.3 ECONOMIC IMPACTS

An EEMAC study using Statistics Canada's Inter-Provincial Model has demonstrated that electricity consumption creates more jobs and more Gross Domestic Product (the sum total of all related economic activity) than oil or natural gas.

Economic Impact of a Million Dollar Consumption in Ontario of Electricity and Natural Gas

	Electricity	Natural Gas
Jobs in Ontario	26.2	3.2
Gross Domestic Product ($)	1,007,842	83,767

SOURCE: STATISTICS CANADA'S 1974 INTER-PROVINCIAL INPUT-OUTPUT MODEL

Another study was done on similar lines using the same model. This study provides for pipeline transportation and distribution in the activities of the gas sector, investment expenditures required for upgrading transmission and distribution systems to handle the increased energy production for both gas and electricity. This study compares the relative advantages of inter-fuel substitution in Ontario in 1988.

Economic Impact of Inter-Fuel Substitution in Ontario in 1980

	Electricity For Oil	Natural Gas For Oil	Advantage Electricity-Gas
GPP in Ontario (1983 $ MBTU)	5.12	3.30	1.82
Jobs in Ontario (per MMBTU)	118	25	93

SOURCE: STATISTICS CANADA'S 1974 INTER-PROVINCIAL INPUT-OUTPUT MODEL

3. ONTARIO HYDRO'S INDUSTRIAL MARKETING PROGRAM

3.1 INTRODUCTION

The Joint Industry Task Force in its first report released in March 1982, identified the industrial market as the one with maximum substitution potential. According to this report up to 1700 MW of electricity can be utilized to effectively displace oil that is currently consumed in Ontario's industrial sector.

3.2 OBJECTIVES

Ontario Hydro's Marketing Division has rightly, in our opinion, focused its attention on the long-term potential of this sector. It has developed a marketing program. The overall objective of the marketing program is to increase electricity's share of the provincial energy market from its current level of 16 per cent (of total energy) to 20 per cent by 1990. However, in the industrial market the immediate objectives are:

3.2.1 in 1984, to achieve a minimum of 70 MW use by industrial customers based on experimental rates

3.2.2 gain commitments in 1984 for new load in 1984 and 1985 through existing rates.

3.3 RATES

Experimental rates for industrial customers were set in 1983 by Ontario Hydro. Under this system, there are three new tariffs, namely intermittent, blended and monthly.

3.4 FINANCIAL INCENTIVES

In addition to the experimental rates, Ontario Hydro has developed a financial incentives program. This program is available to direct and rural industrial customers and can be extended to customers of the municipal electric utilities.

The main features of the program are:

- two-year loan term
- floating interest rate based on prime plus one per cent
- loan to be applied toward purchasing and installation of electric process equipment
- amount of loan to equal up to three years net revenue to Ontario Hydro or cost of installed equipment, whichever is lower
- repayment schedule based on equal payments of blended interest and principal
- clear claim on equipment as collateral.

Also, the Hydro has under consideration alternative loan forms such as:

- guaranteed bank loans
- third party leasing
- shared savings
- bridge financing.

3.5 SALES CAMPAIGNS

As a part of its marketing program, Ontario Hydro is developing two sales campaigns. One focuses on electric induction heating or melting and the other on steam substitution. The campaigns will identify all major customers involved in various forms of heat treatment and all major customers using steam substitution. These campaigns will be supported by appropriate advertising programs.

3.6 INDUSTRIAL INTERACTION MATRIX

Also, Ontario Hydro has developed an "Industrial Interaction Matrix". This matrix provides information on energy substitution, technology, processes and an economic overview of the various industrial sectors. It matches technologies to industries.

It identifies electrical processes within industries. Also, the matrix looks at the development of technology in the market place by industry and by process, reviews the economic health of Ontario industry and identifies industrial applications. The matrix is a powerful analytical tool and will be extremely useful to develop the appropriate marketing strategies.

4. ELECTROTECHNOLOGY — APPLICATIONS AND ADVANTAGES

4.1 IMPORTANT APPLICATIONS

There are a number of applications of electrotechnology that can be adopted by Ontario's industries. Some of the important applications of electrotechnology are:

4.1.1 Induction Heating — Heat Treating
4.1.2 Induction Melting
4.1.3 Thermomechanical Pulping
4.1.4 Adjustable Speed Electric Drive Systems.

4.2 KEY INDUSTRIES

These electrotechnologies have a wide range of applications in Ontario's industries currently employing a large number of people. The key industries that would benefit from electrotechnology applications are:

4.2.1 steel industry currently employing 40,000 people

4.2.2 ferrous foundries currently employing 6,000 people

4.2.3 non-ferrous primary metal industry currently employing 8,000 people

4.2.4 mineral processing industries (carbon, graphite, glass, etc.) currently employing 4,000 people

4.2.5 pulp and paper industry currently employing 21,000 people

4.2.6 natural gas pipeline compressor stations

4.2.7 petrochemical industry currently employing 6,000 people.

NOTE: Employment numbers are our best estimates from various sources.

4.3 ADVANTAGES

There are many advantages offered by electrotechnology. Some of the key advantages are:

- displacement of "imported" energy with electricity
- improved productivity and cost competitiveness
- better export opportunities
- better long-term job creation opportunities
- better environmental control through reduced air pollution.

4.4 INDUCTION HEATING/HEAT TREATING: HIGHLIGHTS

Induction heating/heat treating is a proven electric technology that is being used more and more by Ontario companies to replace fossil fuel fired systems or expand production. The use of induction heating offers the following advantages to Ontario industry:

- precise temperature control
- reduced energy consumption via greater efficiencies, the ability to localize the heating to the desired area only and the elimination of wasted holding energy
- reduced metal losses
- rapid controlled heating with lower operating costs
- can be integrated into a production line to eliminate lengthy batch processing and material handling
- improved plant and local environment via reduced noise, pollution, waste heat and space needs
- accurate energy consumption data to facilitate process costing.

4.5 INDUCTION MELTING: HIGHLIGHTS

Induction melting has significant advantages in the energy-intensive foundry industry. It also offers the non-ferrous foundry industry many advantages over fossil fuel fired furnaces.

Some of the main advantages to the foundry industry are:

- **precise temperature control**
- **rapid melting with low operating costs and greater efficiencies**
- **uniformity of alloy composition, improved product quality and lower rejects**
- **freedom from contamination by undesirable combustion products**
- **reduced metal losses**
- **ability to use a wider variety of raw materials at lower costs**
- **improved plant and local environment with reduced noise, pollution and waste heat**
- **accurate energy consumption data to facilitate process costing.**

4.6 INDUCTION HEATING AND INDUCTION MELTING APPLICATIONS IN THE STEEL AND FOUNDRY INDUSTRIES

4.6.1 THE STEEL INDUSTRY

The steel industry is traditionally regarded as one of the heaviest energy consumers in the industrial sector. The energy sources are primarily coke for the blast furnace, and electrical energy for steelmaking either by the electric furnace route or to produce tonnage oxygen for BOF steelmaking furnaces. In the subsequent operations, the billets, blooms and slabs must be heated to rolling temperatures, normally in gas or fuel fired furnaces although electrical induction heating is also employed for billets. Rolling mills are powered by large HP electrical motors, usually direct current.

Many technological changes are taking place in the iron and steel industry which is having a major impact on the usage of electrical energy. In brief these are:

- increased use of electric furnace melting
- ladle technology
- continuous casting
- direct reduced iron (DRI) technology
- plasma arc technology.

4.6.2 FERROUS FOUNDRIES

Ontario has far more foundries than any other province in Canada. Grey iron, malleable iron and ductile iron are produced. Steel foundries have always used either electric arc furnaces or induction furnaces because of the temperature required for melting. Cast iron, which has a lower melting point, has been smelted in cupolas primarily because of the low capital cost of the equipment and availability of coke. However, this situation is changing rapidly because of the rapidly escalating price of coke and the environmental problems associated with cupola melting. Induction melting offers advantages in quality control, ease of operation, normally lower operating costs and better environmental protection.

4.7 THERMOMECHANICAL PULPING

Thermomechanical pulping (TMP) is a process which produces wood pulp by grinding woodchips at elevated temperature and pressure after a steam impregnation period under similar conditions. A number of variations to the process exist, with the major variables being refining pressure, duration of impregnation and the extent of chemical treatment before refining or between refining stages. Since the earliest commercialization of TMP nearly 15 years ago, it has become an important factor in the highly competitive world market for pulp and paper.

The recent evolution of papermaking technology, coincident with the development of thermomechanical pulping, has allowed TMP to displace increasing amounts of the more expensive chemical pulps. Consequently, in a market place which places a greater emphasis on quality than ever before, the most economic pulp mix for many paper products now includes a large proportion of TMP. This economic incentive will ensure that TMP continues to grow as a percentage of world pulp production.

The advantages of TMP over other methods of pulp production are:

Pulp Producer:	Lower capital costs Lower production costs A more flexible and competitive product
Ontario Hydro:	Increased load Off-peak power usage
Industry:	Opportunity for development of a technology with a growing domestic and export sales potential
Province:	Lower electric rates Better use of the provincial forest resource Reduced pollution from the pulp industry Reduced dependence on fossil fuels.

4.8 ADJUSTABLE SPEED ELECTRIC DRIVE SYSTEMS

The use of adjustable speed electric drive systems for very large compressor drives for pumping stations on natural gas transmission lines is a proven application which could lead to development of new applications in other areas such as pulp and paper, petrochemical, and major utilities.

Two systems were purchased in 1981 for pipelines in Western Canada. These came from European suppliers but the technology does exist in Canada. There is, therefore, considerable scope for increased employment in Ontario by adopting this technology which has exciting possibilities for use in a number of Ontario industries.

The advantages for using very large compressor drives for pumping stations on the Ontario portion of the Trans Canada Pipeline system are:

Gas Utility:	More gas to sell Lower operating costs Lower maintenance costs
Ontario Hydro:	Increased load Off-peak usage
Industry:	Opportunity to develop high-tech systems with export potential
Province:	New employment opportunities Lower gas and electric rates.

4.9 SUMMARY

In summary, Ontario's process industries require an abundant supply of low cost electrical energy and access to the latest technologies. This will increase productivity and yields while decreasing cost, thus allowing us to become more competitive worldwide.

The main problem holding back many projects which could take advantage of electrotechnology in industry, is large capital cost. Innovative financing would help overcome this problem and could be the key to improving our process industries which in turn would improve our competitive position and lead to more jobs through export sales, not to mention the environmental benefits which would also accrue. A number of options are available to us to develop programs that would achieve the desired results. They would involve a co-operative effort between government and the private sector.

Increased use of electricity is not in itself a policy objective. The objective for Ontario is greater industrial productivity through the upgrading of industrial processes. The availability of low cost electricity makes this upgrading economically possible and increased electricity demand is one of the consequences.

Productivity improvement is seen by many as leading to more unemployment because, by definition, fewer workers would produce the same total output. The problem, however, is that Ontario does not have the option of continuing present levels of productivity and employment. The basic choice in a competitive world is between

(a) upgrading industrial processes to increase productivity and gain market share, thus raising total output and total employment, or

(b) retaining the existing processes, gradually losing market share as competitors become more efficient, and thus facing a steady decline in employment.

This report strongly advocates the increased productivity route to economic prosperity.

Obviously, a number of policy initiatives and financial and tax incentives are required. These issues are discussed in the following section.

5. FINANCIAL INCENTIVES FOR INVESTMENT

5.1 INTRODUCTION

In the chapter dealing with Ontario Hydro's industrial marketing program, we have identified the financial incentives offered at the present time by Ontario Hydro. While these incentives are steps taken by Hydro in the right direction, they are not sufficient to justify financially many applications of electrotechnical processes, particularly among large users of energy, such as the iron and steel industry, the pulp and paper industry, the mining industry, etc. Additional financial incentives are required for projects that are proven to be technically and commercially viable.

5.2 PROJECT CATEGORIES

Viable projects requiring financial incentives fall into two broad categories, i.e. "short-term" and "long-term". Short-term projects can be completed in two years or less; long-term projects would take in excess of two years for completion.

5.2.1 SHORT-TERM PROJECTS

Short-term projects would primarily involve conversion from an alternate source of energy to electrical energy with minor upgrading, modernization or expansion of existing plants. These projects would exhibit the following characteristics:

- low capital requirement
- known technology
- require only currently available equipment
- short preparation period
- easily established economics
- short implementation period
- immediate impact on manufacturing and construction industry employment.

5.2.2 LONG-TERM PROJECTS

Long-term projects would include major modernization and expansion (for example, installation of electric furnace steelmaking to replace conventional blast furnaces) and establishment of a completely new industry (for example, aluminum smelting). The characteristics of these projects are very different from a financing standpoint, from the short-term projects discussed above. These are:

- high capital requirements
- new technology
- may require new equipment design
- long lead time for implementation
- very complex economics.

5.3 SHORT-TERM PROJECT FINANCING

The approach to financing for the "short-term" projects and the "long-term" projects are quite different. For effectiveness, funds must be available in the very near future for the short-term projects. The most expeditious means for achieving this appears to be amplification of the scope of finance available through Ontario Hydro. The main features of the financing currently available are:

- two-year terms of repayment
- funds restricted to the purchase of electric process equipment
- amount of loan to equal three years net revenue to Ontario Hydro or cost of installed equipment, whichever is lower
- repayment schedule — equal payments of blended interest and principal
- no forgivable portion
- security: clear claim on equipment.

These features should be reviewed, additional options included and some of the restrictive features removed in order to encourage the implementation of a greater number of short-term projects. In addition, many short-term projects require a broader range of cost-based incentive rates with longer term commitments similar to the intermittent and monthly rates presently offered by Hydro.

5.4 LONG-TERM PROJECT FINANCING

Financial incentives for the larger projects are more difficult to implement and require, to be effective, a combination of tax changes to support special project financing initiatives. Simply defined, in project financing the lenders and other parties providing funds agree to look only to the cash flows of the project being financed for their debt service and only to the project assets for collateral. The project is treated from a financing aspect as a stand-alone business.

Typically, a project financing scheme will have some or all of the following characteristics:

- the assets and cash flows relating to a particular project are segregated from the sponsors general business activities
- the project is usually financed on a highly leveraged or no equity basis
- the project assets and related debts are often not recorded on the sponsors' balance sheet.

5.5 SCIENTIFIC RESEARCH TAX CREDIT MODEL

The Scientific Research Tax Credit (SRTC) scheme offers a model that can be followed in this context. This scheme was developed to encourage R & D in Canada in high-tech industries. A similar tax incentive program is the Quebec Stock Savings Plan. Ontario should consider developing a tax scheme on similar lines to encourage electrical projects.

5.6 ONTARIO HYDRO INITIATIVES

Incremental revenue considerations should be developed by Ontario Hydro to offer a variety of financial incentives, including reduced interest rates.

Net revenue, derived from potential new industrial electric use, allows some financial incentives to be considered without burdening existing customers.

5.7 ONTARIO GOVERNMENT INITIATIVES

The Government of Ontario may consider extending the scope of the Energy Tax Credit scheme to cover electrical process conversion costs.

Another important measure in this direction for the government of Ontario would be to create an Electric Process Fund (EPF) with an inital investment of $250 million. This fund can be utilized to provide loans to viable electrical conversion projects, subsidize feasibility studies (soft costs), etc. Within a span of three to five years, the EPF will pay for itself by way of increased revenues to Ontario Hydro and additional corporate and personal income taxes, etc. to the Province. Increased electricity consumption will reduce the outflow of money from the Province to pay for "imported" oil, natural gas and coal. The EPF will act as a catalyst for growth, not only of the electrical industry and Ontario Hydro, but the provincial economy as a whole.

5.8 CAPITAL COST ALLOWANCE

Currently, a capital equipment expenditure of the nature being discussed is allowed to be written off over a three-year period under the federal income tax rules. However, for purposes of Ontario income tax, the capital tax allowance can be written off over a two-year period.

The Ontario government may consider recommending that the federal government reinstate the two-year write off period.

5.9 CHANGES TO TAX LAWS

There is also a requirement to introduce a combination of changes to the federal and Ontario legislations to facilitate (i) a broader use of investment tax credits and capital cost allowances by third parties and (ii) government guarantees on the debt portion of new financing.

5.10 LEVERAGED LEASING

The leveraged lease, a form of project financing, is a very popular vehicle for modernizing and expanding major industrial facilities in other countries. With a

leveraged lease, a third party owns the new facility and provides part of the funds required through equity. The balance of the capital funds are obtained through debt vehicles. The investment tax credits and the capital cost allowance associated with this new project flow to the equity part of the financing. The industrial company leases and operates the plant.

In Canada, leasing is not widely used since the use of tax credits and capital cost allowances against incomes from other sources is very restricted.

The Ontario government should study this method of project financing and work to clear any tax regulation restraints if the method could be as effective as it appears to be in other countries.

5.11 INDUSTRIAL REVENUE BONDS

Ontario should consider introducing a tax credit transfer facility similar to that used in the United States. Counties in the state of New York, for example, are able to issue industrial revenue bonds which, when held by institutions such as insurance companies, reduced their taxes if they, in turn, loaned money to companies wishing to make an industrial investment in the county. Money borrowed in this way is at a favourable interest rate which encourages investment.

The Ontario government should take any steps necessary to clear the federal restraints which exist preventing the introduction of this type of facility.

6. THE ELECTRICAL EQUIPMENT AND SERVICE INDUSTRY

6.1 SIGNIFICANCE

The electrical industry covers a large sector of the Canadian economy. The industry extends from the utilities responsible for generation, transmission and distribution to manufacturers of electrical products and appliances, electrical contractors and consulting engineers. In Ontario, the industry employs more than 100,000 people directly.

6.1 EXPERTISE

The Canadian electrical industry has established an internationally acclaimed reputation for technical and managerial excellence. Technical design and engineering capability, capacity utilization, safety standards, reliability of service and economies of scale are some of the areas of excellence. Canada has the world's second highest consumption of electrical energy on a per capita basis. This achievement is one of the main factors (in addition to the vast fossil fuel resources) for Canada's energy self-sufficiency.

6.3 RANGE OF EXPERTISE

Canadian expertise in the electrical industry covers a wide range. Canada has accumulated a wealth of knowledge in the design, construction and management of different types of electrical generation systems. Over the past eight decades,

Canadian talent and expertise have built many hydro-electric stations in difficult terrain in remote locations, and thermal and nuclear stations of varying sizes and capabilities. Canadian experts and equipment have been utilized by many countries around the world.

6.4 ONTARIO'S UNIQUE POSITION

A large part of the Canadian electrical industry capability and expertise is located in Ontario. With an Ontario home base built over many years, Ontario consulting engineers, manufacturers, contractors and the utilities are making determined efforts to capture larger shares of the world market.

6.5 EXPORT POTENTIAL

Electrical energy is one of the primary requirements in the developing world. As the pace of development activity improves around the world, the demand for electricity (and therefore, for generation and distribution systems) will increase substantially in the foreseeable future. This provides an excellent opportunity for Ontario's electrical industry. Ontario's expertise in electrotechnology is another area with substantial export potential.

6.6 EXPORTS OF ELECTRICAL ENERGY

There are many opportunities for export of electricity on a large scale and on a long-term basis from Ontario to many neighbouring parts of the United States. These export opportunities, apart from helping our balance of trade, will provide the electrical industry with opportunities to develop new systems and technologies. The recent attempts to export to the General Public Utilities of the United States using submarine cables is a case in point. Had this proposal materialized, it would have given the electrical industry a unique opportunity to demonstrate new technologies and products. Needless to say, many new jobs would have been created.

7. JOB CREATION — THE ELECTROTECHNOLOGY WAY

7.1 ELECTRICITY AND THE ECONOMY

There is a close correlation between electricity consumption and economic activity. Electricity consumption on a per capita basis is an acknowledged measure of economic activity and development. More consumption of electricity will lead to higher levels of economic activity.

7.2 JOBS AND ELECTRICITY CONSUMPTION

A number of studies have demonstrated that electricity per unit of consumption creates more man hours of employment in Ontario than consumption of an equivalent unit of natural gas or fuel oil (See 2.3). This labour intensity of electricity is of special significance in the context of the necessity to create jobs to help solve our critical unemployment problem. In addition, the jobs so created are high quality and of particular interest to highly trained young people.

There are many aspects to the labour intensity of electricity. One is the nature of the jobs themselves, which are generally highly skilled jobs of particular interest to technically trained young people. Another is the link between the industrial use of electrotechnologies and job creation from increased production in Ontario factories.

7.3 PRODUCTIVITY AND PRODUCTION

It is generally accepted that Canada and Ontario, in particular, must reverse the trend of productivity decline and make quantum improvements in the productivity of its manufacturing and process industries. Management, labour and governments are all agreed on this imperative. A major means of achieving this goal is the use of technology, particularly electrotechnology.

Productivity improvement through use of electrotechnology results in increased production capability without commensurate increase in employment. The resulting gains must be used to increase international competitiveness so exports are increased and imports decreased. If the quantum improvement in productivity is achieved, Ontario will have the potential to create more jobs than are lost in the process. This should be the goal for job creation.

7.4 ELECTROTECHNOLOGY AND THE ECONOMY

Electrotechnology is not another temporary gimmick or fad. It is a survival kit for the economy. In Section 4, we have identified some of the key sectors of the economy where electrotechnology will help face the tough challenge of international competition in both the domestic and export markets. A quality product at competitive price will always find a market. Pulp and paper, iron and steel, and non-ferrous foundries are no exception to this rule.

7.5 ELECTROTECHNOLOGY AND SOCIETY

The ultimate beneficiary of choosing the electrical option for Ontario and promoting the use of electrotechnology in Ontario's industries is the Ontario society and, indeed, the whole of Canada. The quality of life is enhanced. The natural environment is protected as the environmental impact of electrical heat and processes is negligible compared to the emissions from fossil fuel fired systems. Most importantly, **jobs are created**; jobs of particular interest and challenge to young people who are affected most by the current unemployment crisis.

8. RECOMMENDATIONS

8.1 THE ELECTRICAL EQUIPMENT AND SERVICES INDUSTRY

8.1.1 The Canadian electrical industry should increase its R & D and productivity improvement spending to enable it to supply quality products of the latest technology at competitive prices in the international market.

8.1.2 The electrical industry should actively promote a comprehensive range of feasibility studies for implementation of the latest applications of electrotechnology with active support of all segments of industry and government.

8.1.3 Through individual company and co-operative advertising, the electrical industry should promote the use of electrotechnology in Ontario industry.

8.1.4 The industry should vigorously support Ontario Hydro marketing programs.

8.1.5 The industry should embark on a campaign to better liaise with Ontario Hydro and the municipal utilities.

8.1.6 The industry should offer seminars to prospective users of electrotechnologies and electrical processes.

8.1.7 The Task Force should be available as an advisory body to the Premier and the Government of Ontario and provide periodic progress reports on the implementation of the Task Force's recommendations made so far.

8.2 ONTARIO HYDRO

8.2.1 Ontario Hydro's current advertising budget is less than 1/10 of 1 per cent of its annual revenue. The dollar expenditures should be increased and the program broadened to ensure adequate coverage to all major market segments (residential, industrial, commercial and agricultural). Also, the advertising activity throughout the electrical industry should be co-ordinated with appropriate co-operative and advertising programs wherever they are feasible.

8.2.2 Ontario Hydro should develop a broader range of cost-based incentive rates with longer term commitments similar to their intermittent and monthly rates.

8.2.3 Ontario Hydro should offer one or more rate seminars annually to the consulting community and electrical industry to ensure adequate knowledge of rate structures and trends.

8.2.4 Ontario Hydro should increase its industrial field sales force from its present level of fourteen people in order to cover more effectively the various markets.

8.2.5 Ontario Hydro should broaden the range of options for its financial incentives and reduce some of the restrictive features.

8.3 THE ONTARIO GOVERNMENT

8.3.1 Continue to support Ontario Hydro and the municipal electric utilities in the aggressive promotion of electrotechnology for increased consumer benefits.

8.3.2 Continue its support of nuclear generation as a safe, clean, economic, job producing, home-grown product.

8.3.3 Establish an "Electrical Process Fund" of $250 million for new electrotechnology applications. Funds would be allocated on the basis of their ability to produce such benefits as improved productivity, a better environment or additional employment.

8.3.4 Embark on a program with Ontario Hydro for broader based electrification of remote communities.

8.3.5 Resist the temptation to add additional taxes to electricity such as the recent Water Rental charge which will add $60 million to Ontario Hydro's cost in 1985.

8.3.6 Take whatever steps are necessary to improve the process of transmission line hearings. We now have a process for southwestern Ontario which has gone on for six years, which will result in some load rejections in 1985, and could potentially cost the electricity consumer and industry hundreds of millions of dollars per year if power is locked in at the Bruce.

8.3.7 Encourage Ontario Hydro and the electric utilities to compete "head to head" with its energy competitors. The consumer will be the net beneficiary.

8.3.8 Expand Ontario Hydro's mandate to include an industrial development objective.

8.3.9 Ontario Hydro's rate structure should span a five-year period. This will help industries to make appropriate investment decisions and free the Hydro management to run their business.